Containercomponents

Container Overview ■ Container components are the smart components in the PlayPlus architecture that handle business logic, data management, and state coordination. They act as the bridge between your application's data layer and the presentational components. Key Characteristics ■ Smart Components ■ Handle business logic and data operations Manage application state using Angular Signals Coordinate between services and presentational components Handle loading states, error states, and data transformations State Management ■ Use Angular Signals for reactive state management Implement loading, error, and data states Provide computed values for derived state Handle async operations with proper error handling Data Flow ■ Inject and use services for data operations Transform data for presentational components Handle user actions and events Manage component lifecycle Template Structure ■ TypeScript Component (component.ts.hbs) ■ import { Component , ChangeDetectionStrategy , inject , signal , computed , } from "@angular/core" ; import { CommonModule } from "@angular/common" ; import { takeUntilDestroyed } from "@angular/core/rxjs-interop" ; import { Subject } from "rxjs" ; @ Component ({ selector : "app-example" , standalone : true , imports : [CommonModule] , templateUrl : "./example.component.html" , styleUrls : ["./example.component.scss"] , changeDetection : ChangeDetectionStrategy . OnPush , }) export class ExampleComponent { private destroy$ = new Subject < void > ( ) ; // Service injections private exampleService = inject (ExampleService) ; // Signal-based state management protected loading = signal (false) ; protected error = signal < Error | null > (null) ; protected data = signal < any [ ] > ([ ]) ; // Computed values protected hasData = computed (( ) => this . data ( ) . length > 0) ; protected canLoadMore = computed (( ) => ! this . loading ( ) && ! this . error ( ) && this . hasData ( )) ; constructor ( ) { this . initializeComponent ( ) ; } private initializeComponent ( ) : void { this . loadData ( ) ; } private loadData ( ) : void { this . loading . set (true) ; this . error . set (null) ; this . exampleService . getData ( ) . pipe (takeUntilDestroyed ( )) . subscribe ({ next : (data) => { this . data . set (data) ; this . loading . set (false) ; } , error : (err) => { this . error . set (err) ; this . loading . set (false) ; } , }) ; } protected onAction (action : any) : void { // Handle user actions console . log ("Action triggered:" , action) ; } protected onError (error : Error) : void { this . error . set (error) ; } protected retry ( ) : void { this . loadData ( ) ; } } HTML Template (component.html.hbs) ■ < div class = " example-container " > <!--

Loading State --> @if (loading()) { < div class = " loading-state " role = " status " aria-live = " polite " > < div class = " spinner " aria-hidden = " true " > </ div > < p > Loading... </ p > </ div > } <!-- Error State --> @if (error(); as errorData) { < div class = " error-state " role = " alert " > < h2 > Something went wrong </ h2 > < p > </ p > < button type = " button " (click) = " retry() " aria-label = " Retry loading data " > Try Again </ button > </ div > } <!-- Content State --> @if (!loading() && !error()) { < div class = " content " > @if (hasData()) { < div class = " data-container " > <!-- Presentational components go here --> < p > Data loaded successfully! </ p > < button type = " button " (click) = " onAction('example') " aria-label = " Perform example action " > Example Action </ button > </ div > } @else { < div class = " empty-state " > < p > No data available </ p > </ div > } </ div > } </ div > Features ■ Built-in Features ■ Service Integration Automatic service injection using inject() function Support for multiple services Proper error handling and loading states State Management Signal-based reactive state Loading, error, and data states Computed values for derived state Lifecycle Management Automatic cleanup with takeUntilDestroyed() Proper component initialization Memory leak prevention Error Handling Comprehensive error states Retry functionality User-friendly error messages Accessibility ARIA labels and roles Keyboard navigation support Screen reader friendly Best Practices ■ Service Usage // Inject services private exampleService = inject (ExampleService) ; // Use in data loading this . exampleService . getData ( ) . pipe (takeUntilDestroyed ( )) . subscribe ({ ... }) ; State Management // Define signals protected loading = signal (false) ; protected error = signal < Error | null > (null) ; protected data = signal < any [ ] > ([ ]) ; // Use computed values protected hasData = computed (( ) => this . data ( ) . length > 0) ; Error Handling protected onError (error : Error) : void { this . error . set (error) ; } protected retry ( ) : void { this . loadData ( ) ; } Basic Container Component ■ # Generate a container component playplus generate container user-list --services=user This creates: UserListComponent with UserService injection Loading, error, and data states Proper error handling and retry functionality Advanced Container Component ■ # Generate with multiple services playplus generate container dashboard --services=user,product,order This creates: DashboardComponent with multiple service injections Complex state management Coordinated data loading Integration with Presentational Components ■ Container components typically: Load and transform data from services Pass data to presentational components via inputs Handle events from presentational components via outputs Manage loading and error states for the entire view // Example integration @ Component ({ ... }) export class UserListContainerComponent { protected users = signal < User [ ] > ([ ]

) ; // Pass data to presentational component protected userData = computed (( ) => this . users ( ) . map (user => ({ id : user . id , title : user . name , description : user . email , isActive : user . isActive }))) ; // Handle events from presentational component protected onUserAction (userId : string) : void { // Handle user action } } Testing ■ Container components include comprehensive test files with: Service mocking State management testing Error handling verification User interaction testing // Example test structure describe ("UserListComponent" , ( ) => { let component : UserListComponent ; let userService : jasmine . SpyObj < UserService > ; beforeEach (( ) => { // Setup with mocked services }) ; it ("should load users on init" , ( ) => { // Test data loading }) ; it ("should handle errors gracefully" , ( ) => { // Test error handling }) ; }) ; Architecture Benefits ■ Separation of Concerns : Business logic separated from presentation Reusability : Presentational components can be reused across containers Testability : Easy to test business logic in isolation Maintainability : Clear data flow and state management Performance : OnPush change detection for optimal performance Next Steps ■ After creating a container component: Implement service methods for your specific use case Add presentational components to display data Customize loading and error states for your UI Add routing if needed Write comprehensive tests for all scenarios Developer Checklist ■ Before Creating Container Components: ■ Does the component handle business logic and data management? Are services properly injected using inject()? Are all state updates using Angular Signals? Are loading, error, and data states implemented? Is OnPush change detection enabled? Are async operations handled with error boundaries? Are computed values used for derived state? Is takeUntilDestroyed() used for subscription cleanup? Are user actions delegated to services? Do I have unit tests with mocked services? Is data transformed for presentational components?

```
import {
  Component,
  ChangeDetectionStrategy,
  inject,
  signal,
  computed,
} from "@angular/core";
import { CommonModule } from "@angular/common";
import { takeUntilDestroyed } from "@angular/core/rxjs-interop";
import { Subject } from "rxjs";

@Component({
  selector: "app-example",
  standalone: true,
  imports: [CommonModule],
```

```
  templateUrl: "./example.component.html",
  styleUrls: ["./example.component.scss"],
  changeDetection: ChangeDetectionStrategy.OnPush,
})
export class ExampleComponent {
  private destroy$ = new Subject<void>();

  // Service injections
  private exampleService = inject(ExampleService);

  // Signal-based state management
  protected loading = signal(false);
  protected error = signal<Error | null>(null);
  protected data = signal<any[]>([]);

  // Computed values
  protected hasData = computed(() => this.data().length > 0);
  protected canLoadMore = computed(
    () => !this.loading() && !this.error() && this.hasData()
  );

  constructor() {
    this.initializeComponent();
  }

  private initializeComponent(): void {
    this.loadData();
  }

  private loadData(): void {
    this.loading.set(true);
    this.error.set(null);

    this.exampleService
      .getData()
      .pipe(takeUntilDestroyed())
      .subscribe({
        next: (data) => {
          this.data.set(data);
          this.loading.set(false);
        },
        error: (err) => {
          this.error.set(err);
          this.loading.set(false);
        },
      });
  }

  protected onAction(action: any): void {
    // Handle user actions
    console.log("Action triggered:", action);
  }
```

```
  protected onError(error: Error): void {
    this.error.set(error);
  }

  protected retry(): void {
    this.loadData();
  }
}


---

<div class="example-container">
  <!-- Loading State -->
  @if (loading()) {
  <div class="loading-state" role="status" aria-live="polite">
    <div class="spinner" aria-hidden="true"></div>
    <p>Loading...</p>
  </div>
  }

  <!-- Error State -->
  @if (error(); as errorData) {
  <div class="error-state" role="alert">
    <h2>Something went wrong</h2>
    <p>{{ errorData.message }}</p>
    <button type="button" (click)="retry()" aria-label="Retry loading data">
      Try Again
    </button>
  </div>
  }

  <!-- Content State -->
  @if (!loading() && !error()) {
  <div class="content">
    @if (hasData()) {
    <div class="data-container">
      <!-- Presentational components go here -->
      <p>Data loaded successfully!</p>

      <button
        type="button"
        (click)="onAction('example')"
        aria-label="Perform example action"
      >
        Example Action
      </button>
    </div>
    } @else {
    <div class="empty-state">
      <p>No data available</p>
    </div>
```

```
    }
  </div>
  }
</div>


---

// Inject services
private exampleService = inject(ExampleService);

// Use in data loading
this.exampleService.getData()
  .pipe(takeUntilDestroyed())
  .subscribe({...});


---

// Define signals
protected loading = signal(false);
protected error = signal<Error | null>(null);
protected data = signal<any[]>([]);

// Use computed values
protected hasData = computed(() => this.data().length > 0);


---

protected onError(error: Error): void {
  this.error.set(error);
}

protected retry(): void {
  this.loadData();
}


---

# Generate a container component
playplus generate container user-list --services=user


---

# Generate with multiple services
playplus generate container dashboard --services=user,product,order


---
```

```
// Example integration
@Component({...})
export class UserListContainerComponent {
  protected users = signal<User[]>([]);

  // Pass data to presentational component
  protected userData = computed(() => this.users().map(user => ({
    id: user.id,
    title: user.name,
    description: user.email,
    isActive: user.isActive
  })));

  // Handle events from presentational component
  protected onUserAction(userId: string): void {
    // Handle user action
  }
}


---

// Example test structure
describe("UserListComponent", () => {
  let component: UserListComponent;
  let userService: jasmine.SpyObj<UserService>;

  beforeEach(() => {
    // Setup with mocked services
  });

  it("should load users on init", () => {
    // Test data loading
  });

  it("should handle errors gracefully", () => {
    // Test error handling
  });
});
```